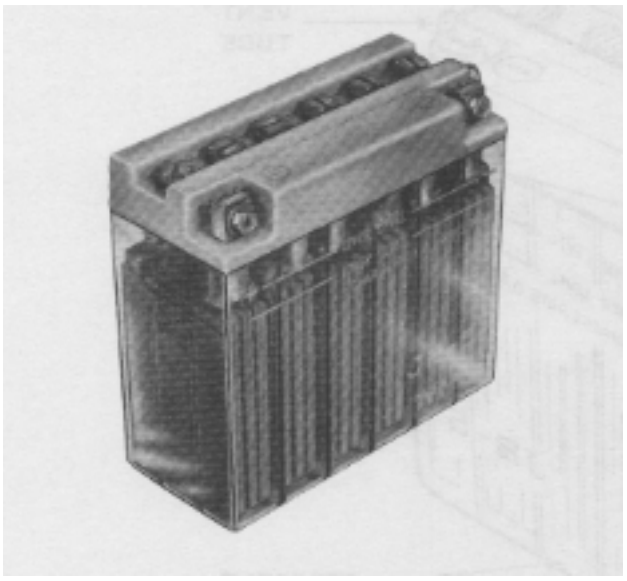
THEORY OF OPERATION



A battery produces an electric current by chemical action. A battery consists of one or more units called "cells." Cells may be divided into two classes: primary and secondary (storage).

Cells used in flashlights, hearing aids, and portable radios are primary cells. They produce an electric current because of materials used in their construction. When all the chemical energy has been converted into electrical energy, the cell can no longer be used until new materials are added.

Secondary, or storage, cells have reversible actions known as "charge" and "discharge." A storage cell must first be charged by sending a current through the positive terminal from an outside source. On discharge, current passes through the cell in an opposite direction. When the cell provides a current, or discharges, it simply reverses the chemical reaction that takes place during the charging period. An electric current (charge current) replaces the lost chemical energy before the cycle can start again.

The lead-acid battery used in Lawn-Boy mowers consists of six cells. (Figure 1.) The atoms in the electrolyte are neutral because they have an equal number of positive and negative charges. When electrolyte is dissolved in water, it splits into positive and negative ions. Positive ions have a deficiency of electrons. Negative ions have an excess of electrons. The positive plate is now attacked by the electrolyte (sulfuric acid) which picks up some electrons. The electrolyte acts as a carrier for these electrons to the negative plate and from there through the rest of the circuit.

During the charging process the chain reaction is reversed and electrons move through the electrolyte to the positive plate.

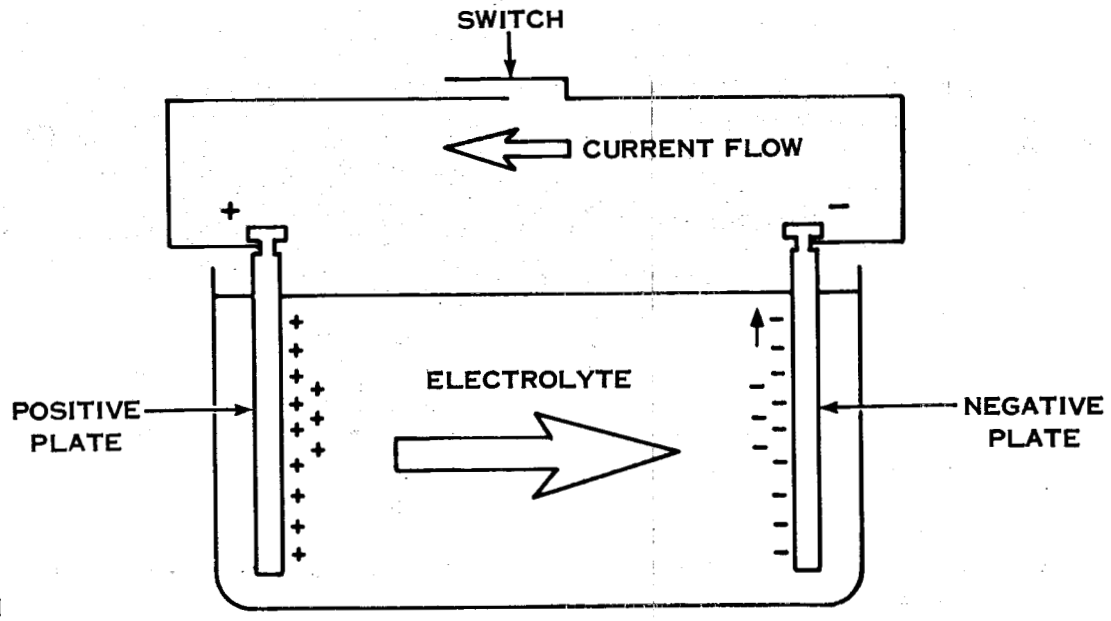


FIGURE 1

BATTERY SERVICE

BATTERY STRUCTURE

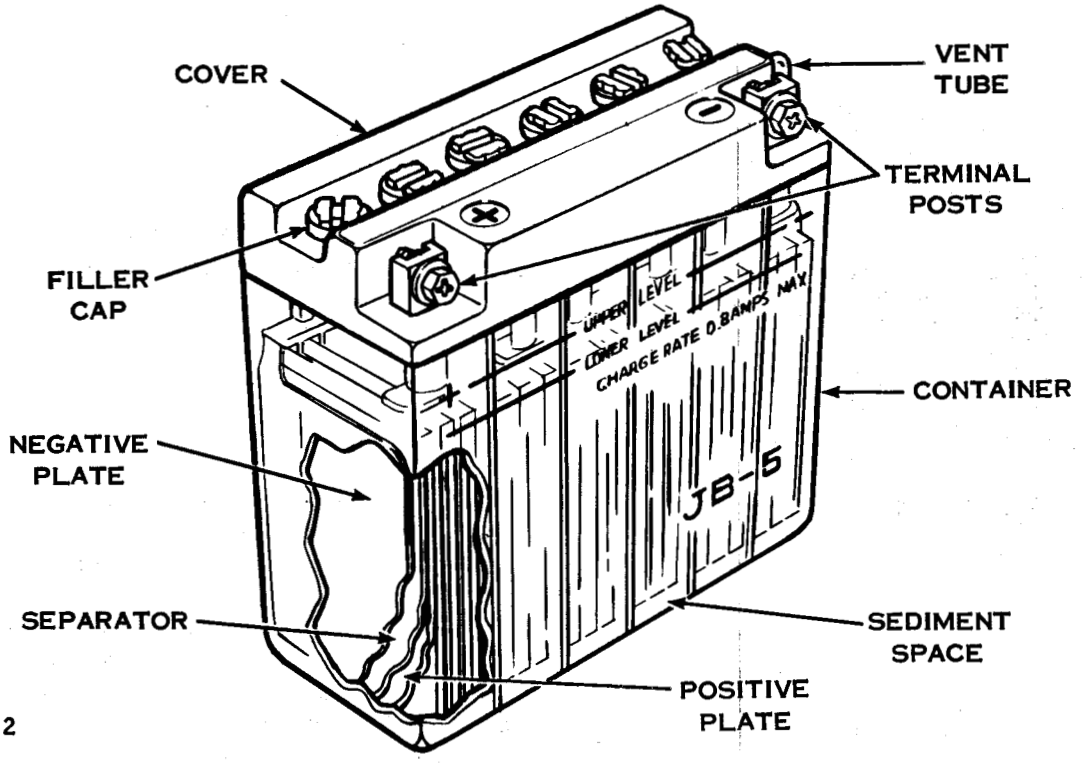


FIGURE 2

The main parts of a battery are illustrated in figure 2.

BATTERY

The negative plate consists of a grid framework filled with a porous mass of lead. This spongy form of lead allows electrolyte to penetrate the negative plates freely for the life of the battery.

The positive plates are made up of a grid framework which is filled with a lead peroxide material.

No positive plate may touch a negative plate or all plates in the cell will lose their stored energy. Therefore thin sheets of non-conducting material called separators are placed between the plates.

The lead and lead peroxide plates are referred to as the "active" materials of the battery. These materials cannot become active until they are covered by a diluted solution of sulfuric acid called "electrolyte." Sulfuric acid acts as a carrier for the electric current within the battery.

The battery container and cover are both made of a durable plastic and are inactive to the corrosive electrolyte.

Filler plugs are designed to baffle gases, prevent loss of acid due to vibration and for filling cells to their proper level.

MAINTENANCE AND SERVICE CHECKS

Maintenance

NOTE

Maintenance checks should be made regularly to assure good performance of the battery.

Maintenance checks should be made regularly to assure good performance of the battery.

1. Check fluid level in each cell and add mineral free water if necessary.
2. Check terminals for dirt and grease. If dirty or greasy remove cable clamps and clean terminals.
3. Check voltage of battery. If battery is no longer strong enough to start mower or it is a hard starting mower, recharge battery.

4. To recharge battery, insert plug into charger jack. Plug trickle charger into 110 volt AC outlet, allowing battery to charge approximately ten hours.

NOTE

Do not charge for longer than 48 hours, as extended charge times will cause electrolyte to evaporate leaving a dry and damaged battery. Allow battery to stand for some time after filling before placing on charge.

5. When charging battery use only the LAWN-BOY charger supplied with the mower. Do not charge at a rate exceeding 1 amp.

Servicing

Specific Gravity of Battery

When using a hydrometer that shows specific gravity, the following specific gravity numbers (when measured at 80°F (26.7°C) indicate the approximate battery charge condition.

State of Charge	Specific Gravity Reading
Fully Charged	1.265
75% Charged	1.225
50% Charged	1.190
25% Charged	1.155
Discharged	1.120

1. Remove caps from battery using screwdriver.

2. Place hydrometer (part no. 681007) (see figure 3) into each cell. Squeeze bulb on top of hydrometer and release slowly.

3. Number of balls floating indicates condition of battery. If any cell reads two balls or less floating, recharge battery for 10 hours.

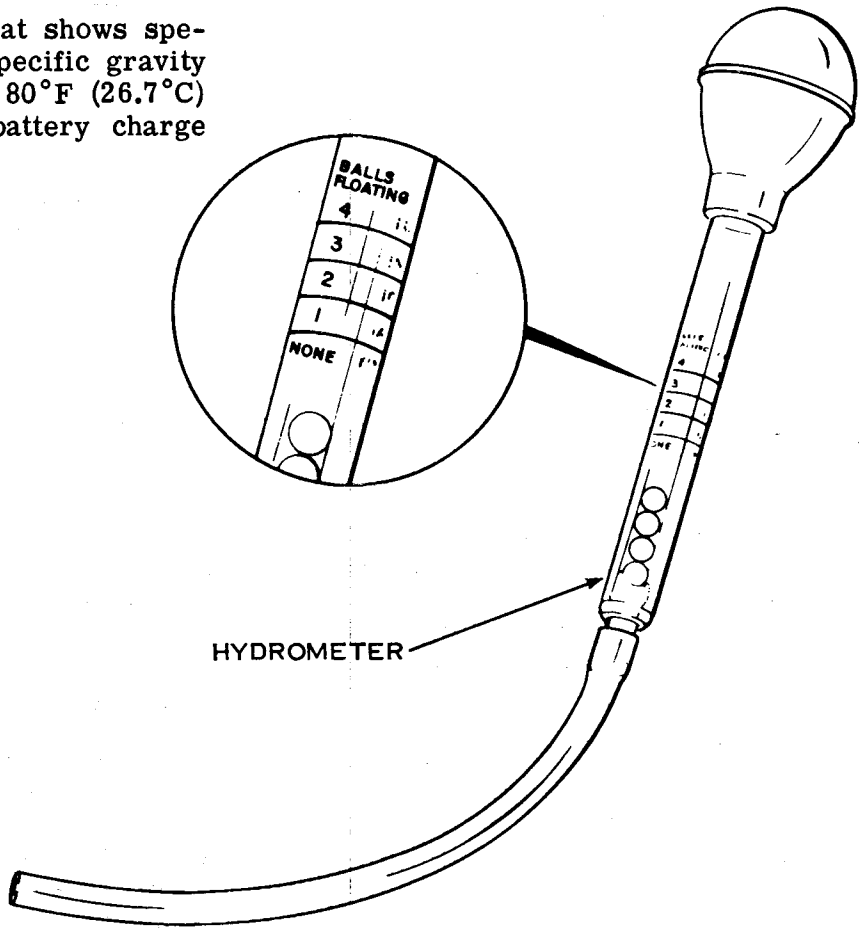


FIGURE 3

BATTERY SERVICE

NOTE

For accuracy, the liquid level of the cells should be at normal height when a hydrometer reading is taken. Hydrometer readings should never be taken immediately after water has been added to battery or immediately after charging. Let stand for 20 minutes. Specific gravity of fully charged battery should be 1.265 with 80°F. (26.7°C) electrolyte temperature.

⚠ SAFETY WARNING

Battery electrolyte is an acidic solution and should be handled with care. If electrolyte is spilled or splashed on any part of the body, immediately flush the exposed area with liberal amounts of water and obtain medical aid as soon as possible.

BATTERY CORROSION

The overflow of electrolyte causes many problems. Corrosion begins to form on the battery terminals and in battery box. Corrosion is a good conductor, causing a drain on battery even when mower is not in use.

1. Corroded batteries, terminals and frames should be cleaned with a solution of four tablespoons of baking soda to a gallon of water.
2. Brush on the soda-water solution with a brush and flush clean with fresh water.
3. Coat terminal connections with petroleum jelly after reassembly to retard corrosion.

⚠ SAFETY WARNING

Do not use pressure gun greases on connections as some contain graphite, which conducts electricity, and others will deteriorate battery sealer.

AGING BATTERIES

As batteries age, they progressively lose their ability to reach their rated full charge voltage and specific gravity. The first indication would be high water usage.

1. When this happens, charging time should be decreased from 10 hours to 8 hours, from 8 hours to 6 hours, etc., until battery's useful life has been spent.
2. When specific gravity readings, taken at one hour intervals, remain the same, the battery has all the charge it is capable of accepting.
3. If the level of voltage is too low for normal operation of mower, replace battery.

TESTING BATTERY FOR SERVICEABILITY

INSTRUMENTS

Testing a battery for serviceability requires the use of instruments of unquestioned accuracy.

A Hydrometer should be graduated to read from 1.160 to 1.320 in graduations of .005 specific gravity. The graduated markings should be not less than 1/16" (1.6 mm) apart and accurate to within .002 Sp. Gr. The graduated portion of the stem should be about 2 inches (50.8 mm) long. Clearance between float and barrel, at smallest diameter, should be a minimum of 1/8 inch (3.2 mm) around all sides.

A battery Thermometer should be of the mercury-in-glass type, have a scale reading as high as 125°F. (51.6°C), and be designed for not over a 1-inch (25 mm) bulb immersion. A suitable dairy-type thermometer may prove satisfactory for the purpose.

Shop electrical meters for battery testing should be accurate within 2 percent over the entire scale range. Laboratory meters should be accurate within 1/2 of 1 percent over the entire scale range and should be of the permanent magnet moving coil type,

the voltmeter preferably being shielded from external magnetic fields.

A good Voltmeter should have a 3-volt scale in .02-volt divisions and be accurate to within 1% over full scale for measuring cell voltage and/or a scale covering 15 volts in .1-volt divisions for testing overall battery voltage. The resistance of a good voltmeter is at least 20,000 ohms per volt. A portable type D.C. voltmeter of at least 20,000 ohms per volt sensitivity, accurate to at least 1% and having a range of 150/15/3 volts would be satisfactory for accurate test work.

A portable type D.C. Ammeter accurate to at least 1 percent, with scale range of 50/25/10 amperes and used with an external 500 ampere shunt to obtain a 500 ampere range, would be satisfactory for accurate test work.

OPEN-CIRCUIT VOLTAGE BATTERY TESTERS

The open-circuit voltage of a battery will vary slightly with the specific gravity of the electrolyte in the individual cell. A sensitive voltmeter can therefore be provided with a scale which indicates equivalent specific gravity or state of charge and can be used as a sort of "electrical hydrometer" under certain conditions. Such instruments must have a separate scale calibrated for each separate fully-charged gravity, or a correction factor must be used if the cells are adjusted to any other fully-charged gravity. For example, such O.C.V. meters, in order to be reliable, must either be used only on batteries and/or cells whose fully-charged gravity is that for which the instrument is calibrated, or be used with a correction factor of .01 volt equals .010 specific gravity.

Example: 1.265 Sp. Gr. = 2.10 Volts/Cell = 6.3 Volts/6-Volt Battery

= 12.6 Volts/12-Volt Battery

No temperature correction factor has to be applied to the gravities indicated by O.C.V. meters. However, the instruments cannot be used on batteries and/or cells which have just come off charge, as the gases held on the plates cause the instrument to give a falsely high reading. The instruments are useful for testing batteries in stock. Letting batteries stand on open circuit for several hours after charging will dissipate the gases from the plates and enable correct readings to be obtained.

HIGH-RATE DISCHARGE EQUIPMENT

High-rate discharge equipment is available in a variety of forms. Most of these work on the principle of discharging the battery through a fixed resistance, for about 15 seconds, and measuring the battery and/or cell voltages while discharging a high rate to determine the cranking ability of the battery.

The tester meter must have 2% accuracy over the entire scale range(s). The tester should be capable of discharging the battery as a unit and measuring voltage as the criterion for passing or failing the battery.

BATTERY TESTING CHART

A step-by-step procedure based on hydrometer and voltmeter readings is shown in the "Battery Testing Chart". This chart will be helpful in rendering correct battery service.

BATTERY TESTING CHART

HYDROMETER TEST (80°F.) (26.7°C) (See Note "A" Below)	STATE OF CHARGE OR BATTERY CONDITION	CORRECTION OR REMEDY
(1) 1.215 Sp. Gr. or higher	(1) Probably good.	(1) No correction required if variation among cells is not over .050 Sp. Gr. Make a thorough check of the electrical system for short circuits, loose connections, corroded terminals, etc.
(2) Less than 1.215 Sp. Gr.	(2) Questionable.	(2) Battery should be recharged. After recharge repeat step No. 1. (See note "B.")
(3) Cells showing more than 50 points (.050 Sp. Gr.) variation in gravity.	(3) A. Short circuit in low cell. B. Loss of electrolyte by leakage or excessive overcharge. C. Improper addition of acid or contaminates. D. Natural or premature failure. E. Cracked box partition.	(3) Try to recharge battery (See note "B.") If .050 Sp. Gr. variation persists battery should be replaced. If battery accepts recharge and variation does not persist, repeat step No. 1.
(4) Battery or cells showing more than 1/2 charge.	(4) Probably good.	(4) Apply remedy given for No. 1 above.
(5) Battery showing less than 1/2 charge or cells showing less than 1/2 charge but not more than .05 volt variation.	(5) Questionable.	(5) Apply remedy given for No. 2 above.
(6) If cell connectors are accessible, cells showing more than .05 volt variation.	(6) See No. 3 above.	(6) Apply remedy given for No. 3 above.

NOTE: A - For batteries having normal fully-charged specific gravity of 1.265 or above at 80°F. (2.67°C), the electrolyte level should be 1/4" to 1/2" (6 to 13 mm) above separators. Do not take readings soon after adding water, but charge until solution is mixed. Hydrometer readings should be corrected for temperature if temperatures are very far from 80°F. (26.7°C).

NOTE: B - For batteries with special fully-charged gravity and/or extra electrolyte space - consult manufacturer's recommendations.

For proper charging procedures refer to "Charging Storage Batteries," and consult charging equipment manufacturer's specifications.

BATTERY REPLACEMENT AND STORAGE

Battery Replacement

The dry charged battery is a battery containing charged plates in a dry condition.

NOTE

Electrolyte and battery both are to be at room temperature (70°F to 80°F).

1. Fill battery with electrolyte (sulfuric acid and water) of 1.260 - 1.265 specific gravity. Battery is now approximately 75% fully charged. A fully charged battery should indicate 12.0 - 12.5 volts on a voltmeter.

2. After filling, charge battery for four hours using trickle charger. This will bring battery to full capacity.

⚠ SAFETY WARNING

Prior to filling battery with electrolyte, cut off sealed end of vent hose. Battery must vent. Lack of venting may cause battery to explode.

Battery Storage

NOTE

When a customer has persistent battery trouble, suggest the following steps.

1. Before storage, battery should be thoroughly cleaned and brought up to full charge.

2. After charging, electrolyte level should be checked and brought up to the proper level by adding mineral free water.

3. Battery should be checked and brought up to full charge at no less than 30-day intervals.

4. Batteries should be kept in a cool, dry storage area. The cooler the temperature the less the self-discharge will be.

A fully charged wet battery, in good condition, can be stored at a temperature between +50°F and -10°F for a period of 4 to 5 months without damage. After this period it should be recharged for 8 to 10 hours. If storage temperature is above 50°F battery will need recharging every 30 days, and if temperature is above 100°F battery will need recharging every 15 days in order to maintain proper chemical balance.

BATTERY FAILURES

BATTERIES

Figure 1 shows a good plate assembly. Figures 2 and 3 show the lead paste washed away from the grids. The paste is soft. Overcharging is one of the things that produces corrosion of positive grids and excessive gassing, which loosens active material in the plates, particularly the positive plates.

The loosened material will collect on the bottom as a fine brown sediment. Overcharging also causes excess loss of water and excessive gassing.

Figure 4 shows the paste extruding and shorting to an adjoining plate.

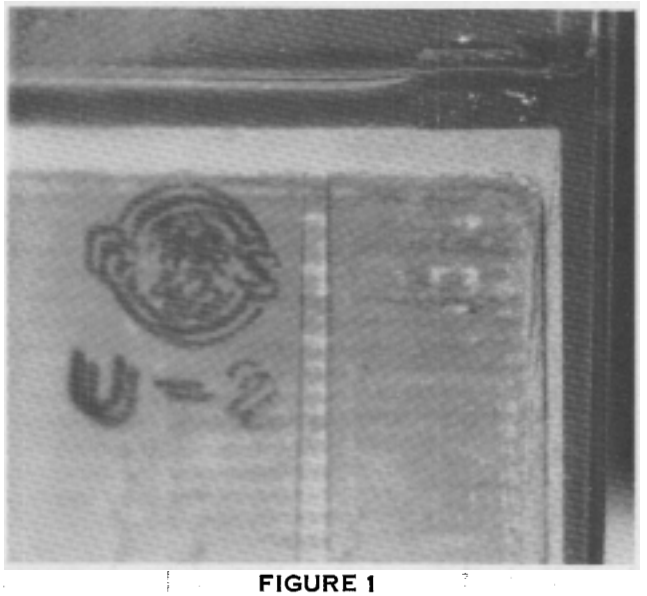


FIGURE 1

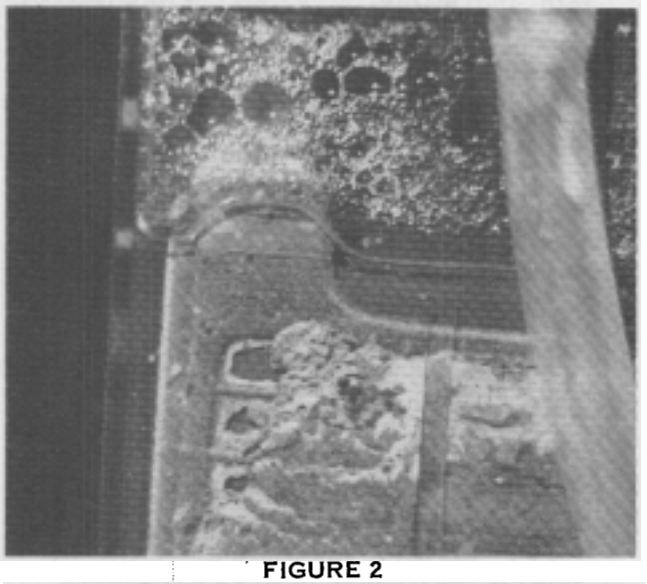


FIGURE 2

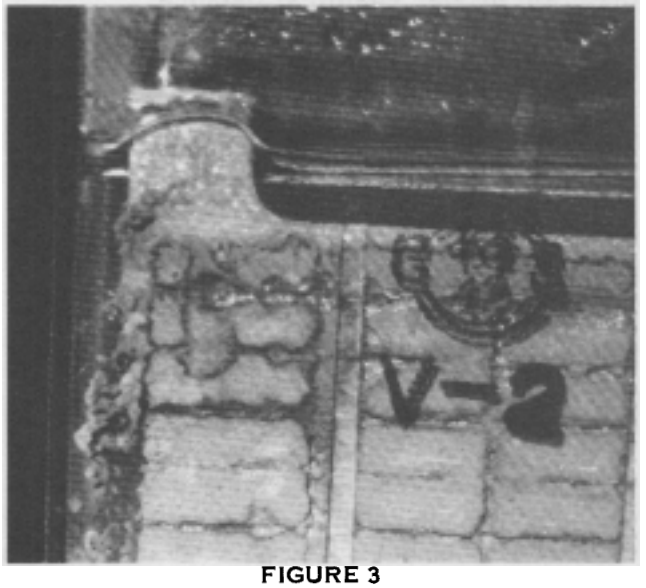


FIGURE 3

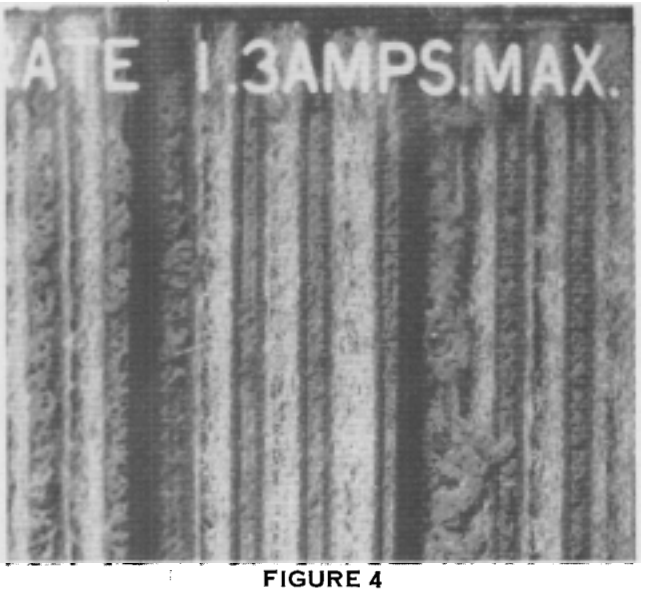


FIGURE 4

Figure 5 shows the plates warped and part of a grid cracked and broken away.

Insufficient charging is one of the most common causes of buckling of the plates. Figure 5 shows some buckling (plates are curved). The lead sulfate occupies more space than the original material, and an excessive amount of it strains the plates.

Figure 6 shows a sulfated plate. Note the light colored corrosion. This material is lead sulfate. Large crystals or crusts of lead sulfate may form on the plates as a result of neglect or misuse. The excessive sulfation is difficult to reduce, and is injurious to the plates.

Sulfation can be the result of:

1. Allowing the battery to stand in a discharged condition for a considerable time.
2. Filling the cells with electrolyte when water should have been used.
3. Operating the battery at excessive temperature (above 120°F).
4. Persistent undercharging.

The sediment deposited in the bottom is usually a fine white powder. This is principally lead sulfate.

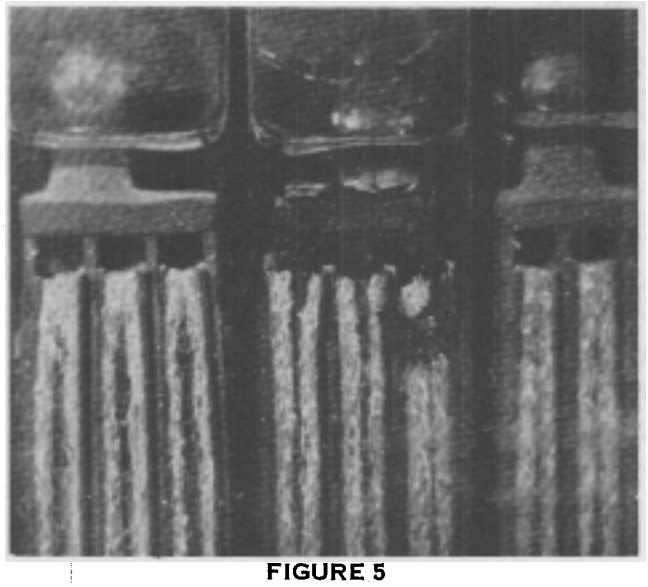


FIGURE 5

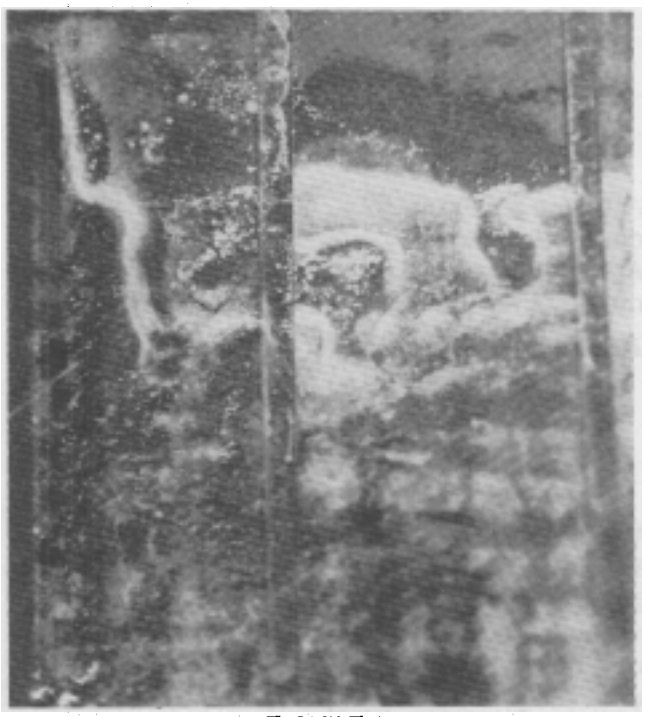


FIGURE 6

BATTERY SERVICING D-400 SERIES

BATTERY

The battery is a 12 volt, DRY CHARGED battery designed specifically for Lawn-Boy mowers.

PREPARING A BATTERY FOR SERVICE

Remove fill plugs and add 19-1/2 ounces of electrolyte to upper level marks: Fill each cell to an equal level. Models equipped with a charger jack and plug require that the battery be installed on the mower before charging the battery.

Allow battery to stand for 15 minutes before attaching trickle charger.

DO NOT CHARGE AT A RATE EXCEEDING 1 AMP.

NOTE

Connect the trickle charger to the battery before plugging it into a 110 volt outlet. Connect the plug to the charger jack (located in engine shroud on earlier models and in battery box on later models) before plugging the trickle charger into a 110 volt outlet.

Allow approximately 10 hours to obtain a complete charge.

Add necessary fluid to maintain fluid level mark at the UPPER LEVEL MARKS.

ASSEMBLING BATTERY TO MOWER

SAFETY WARNING

DO NOT ALLOW BATTERY TERMINALS TO MAKE CONTACT WITH BATTERY COVER SUPPORT RODS.

With battery terminals facing the engine, insert battery into battery mounting bracket. Important: The battery must be mounted with the battery terminals facing the engine or the battery cover cannot be installed correctly. Do not operate without battery cover in place.

With the battery inserted in the mounting bracket, insert battery overflow hose through drain hole in the mower housing. Cut off excess length allowing 1 inch of hose to extend below the drain hole.

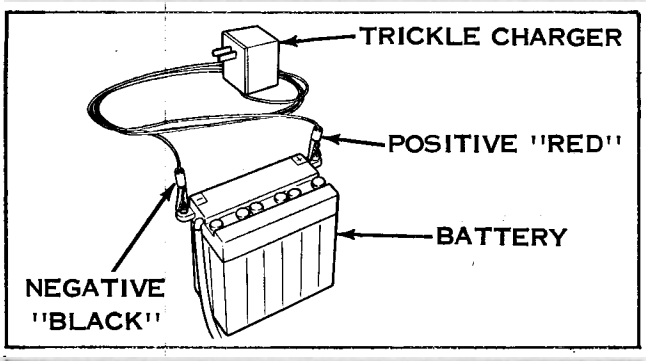
NOTE

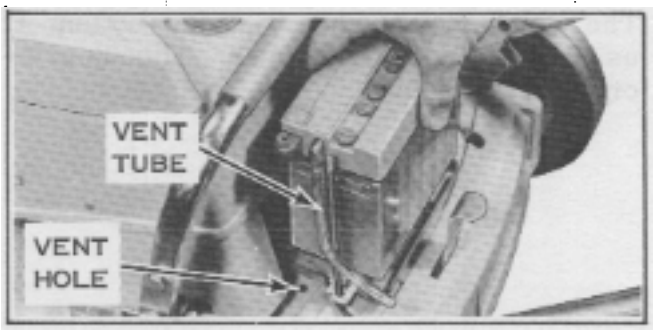
If vent hole is located on the right side of the battery, route overflow hose between the engine and the battery. Insert thru the drain hole. Allowing 1 inch of hose to extend below mower housing. Cut hose as required.

Connect battery leads to correct terminals: red to red (+, positive), black to black (-, negative).

Install the battery hold down strap (flat side down).

Secure battery cover with acorn nuts and washers furnished in the hardware package.



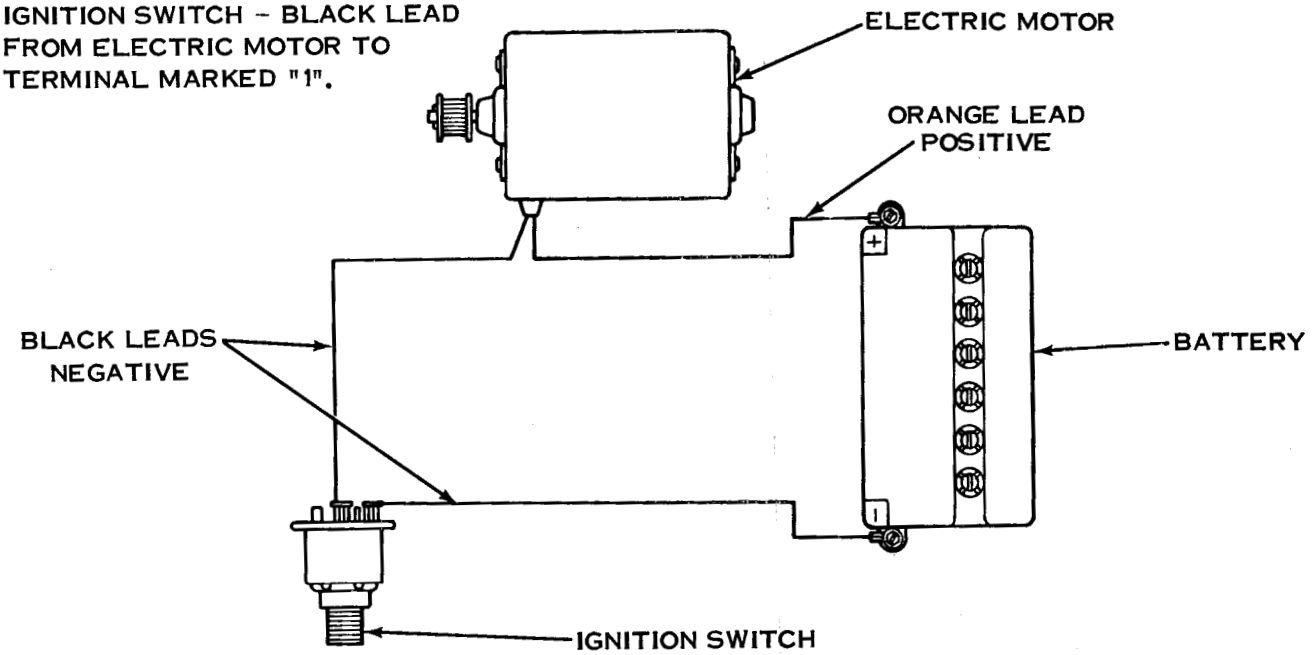


Place rear wheel adjustment lever in number 1 position. If lever rubs against battery cover, loosen battery bracket mounting bolts and move bracket until proper clearance is achieved.

WIRING DIAGRAMS — LEAD ACID BATTERY

WIRING DIAGRAM - TWO POST SWITCH

BLACK LEAD FROM BATTERY TO TERMINAL MARKED "B" ON IGNITION SWITCH - BLACK LEAD FROM ELECTRIC MOTOR TO TERMINAL MARKED "1".



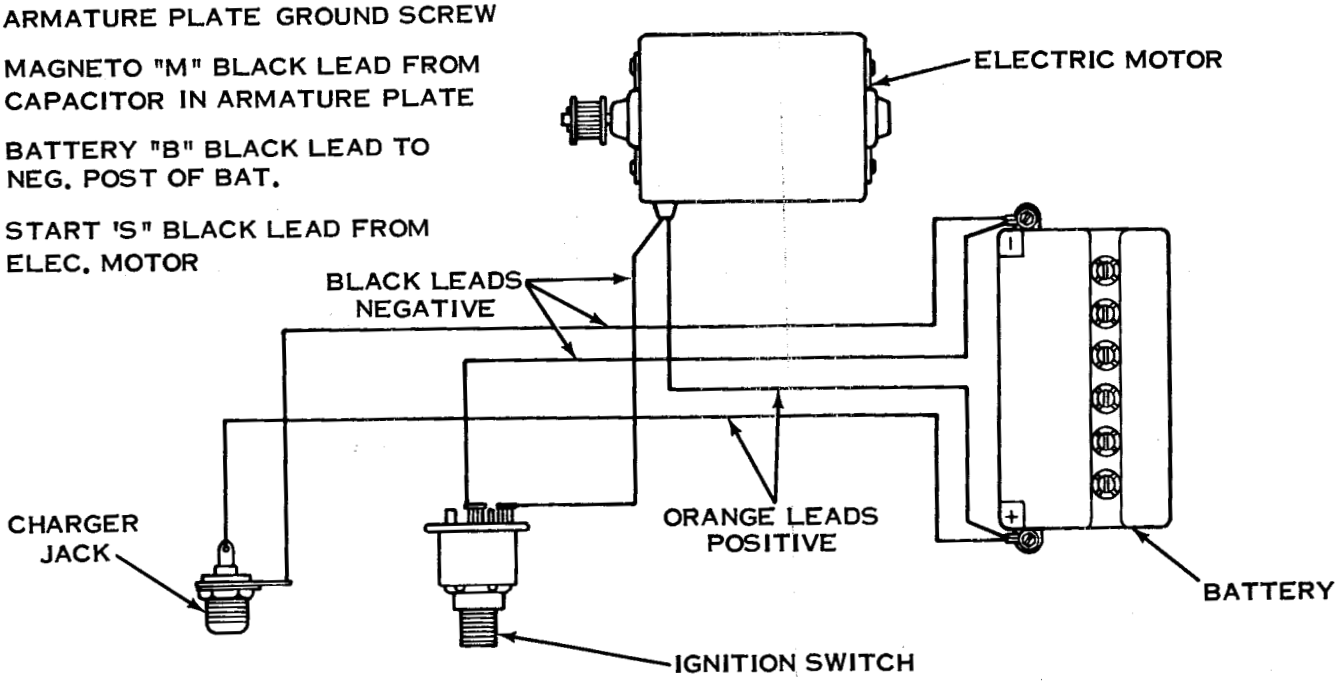
WIRING DIAGRAM - FOUR POST SWITCH

WIRE LEADS ATTACHED TO SWITCH AS FOLLOWS:
GROUND "G" BLACK LEAD FROM ARMATURE PLATE GROUND SCREW

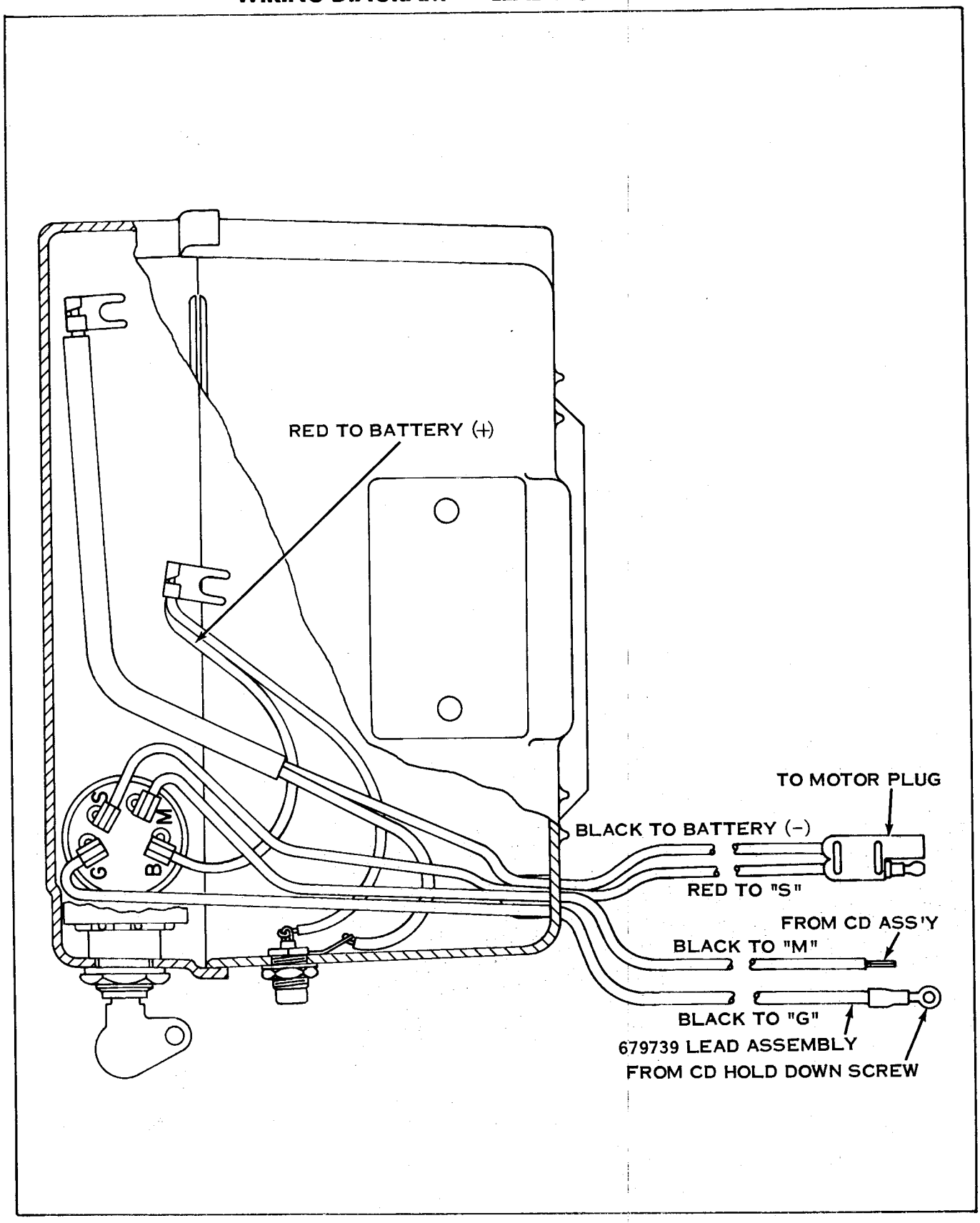
MAGNETO "M" BLACK LEAD FROM CAPACITOR IN ARMATURE PLATE

BATTERY "B" BLACK LEAD TO NEG. POST OF BAT.

START "S" BLACK LEAD FROM ELEC. MOTOR



8330E-8231E-8232E
WIRING DIAGRAM — LEAD ACID BATTERY



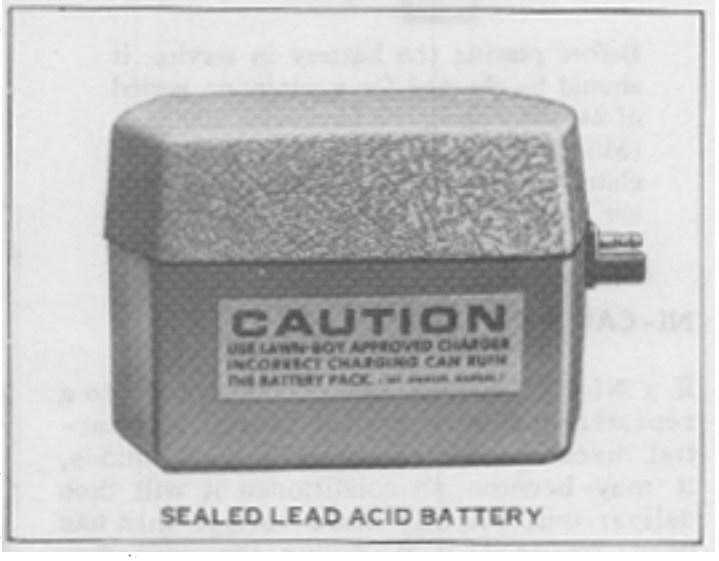
BATTERIES

SERVICING — CARE — MAINTENANCE

COVER REMOVED FOR ILLUSTRATION PURPOSES

The Nickel-Cadmium (NI-CAD) battery Part Number 681359 is a 12 volt dry cell type with 1 (A.H.) ampere, hour capacity. This battery was first introduced on the self-charging (alternator) electric start models in 1975. Refer to pages 13-14 and 13-15 for NI-CAD battery service information.

In 1980 the Sealed Lead Acid (S.L.A.) 12 volt battery Part Number 682869 replaced the NI-CAD battery. The S.L.A. battery has 2.5 (A.H.) ampere hour capacity which provides more cranking power. The service care and maintenance requirements of this battery are different than the NI-CAD. Refer to pages 13-16 and 13-17 for this information.



SEALED LEAD ACID BATTERY

NICKEL-CADMIUM BATTERY PACK

⚠ SAFETY WARNING

DO NOT REMOVE THE NI-CAD BATTERIES FROM THE BATTERY PACK. THE BATTERY WILL ARC ACROSS METAL SURFACES CAUSING INJURY OR FIRE. (EXAMPLE: RINGS, WATCHES AND METAL TABLES.)

The NI-CAD battery pack consists of five sticks of two batteries each for a total of ten batteries connected together as shown.

COVER REMOVED FOR ILLUSTRATION PURPOSES

The battery pack is shipped from the factory in an uncharged condition.

⚠ SAFETY WARNING

TO PREVENT DAMAGE TO THE BATTERIES, USE ONLY THE LAWN-BOY 100 M.A. (MILLIAMP) TRICKLE CHARGER WHEN CHARGING BATTERY PACK.

IF PROPER CHARGER IS NOT USED, DAMAGE MAY OCCUR TO THE BATTERY OR IT MAY EXPLODE CAUSING INJURY TO YOU OR OTHERS.

NOTE:

Before placing the battery in service, it should be charged for a minimum period of 24 hours using the Lawn-Boy 100 M.A. (Milliamp) charger provided. Connect the charger to the battery — then plug charger into 115 volt outlet. Voltage must be 12.3 volts or higher after completion of this procedure.

NI-CAD BATTERY MEMORY

If a NI-CAD battery has been subjected to a repeated series of partial charge and partial discharge cycles of similar magnitudes, it may become so conditioned it will then deliver only slightly more voltage than has been required of it during the preceding repetitive cycles.

Thus, if the repetitive discharge cycles were short, it may appear as though the battery capacity has been shortened.

Sometimes this conditioning is referred to as having a "memory." In order to remove this memory and return the battery to near the original capacity, it must be deep discharged and then recharged.

If a NI-CAD battery is suspicious of this condition, it may be deep discharged by connecting a 12-volt automotive light bulb across the terminals and leaving it burn until the light goes out. It then can be recharged using the Lawn-Boy 100 M.A. trickle charger. Charge overnight for 12 hours. Do not apply a "quick" charge to the battery.

BATTERY MAINTENANCE

We recommend the following steps to maintain proper performance from the battery:

NICKEL-CADMIUM BATTERY SERVICING

1. When necessary, charge battery overnight 10 to 12 hours using the Lawn-Boy 100 M.A. (milliamp) trickle charger provided. Do not apply a "quick" charge to the battery.

   ⚠ SAFETY WARNING

   IF A PROPER CHARGER IS NOT USED THE BATTERIES WILL BE DAMAGED.

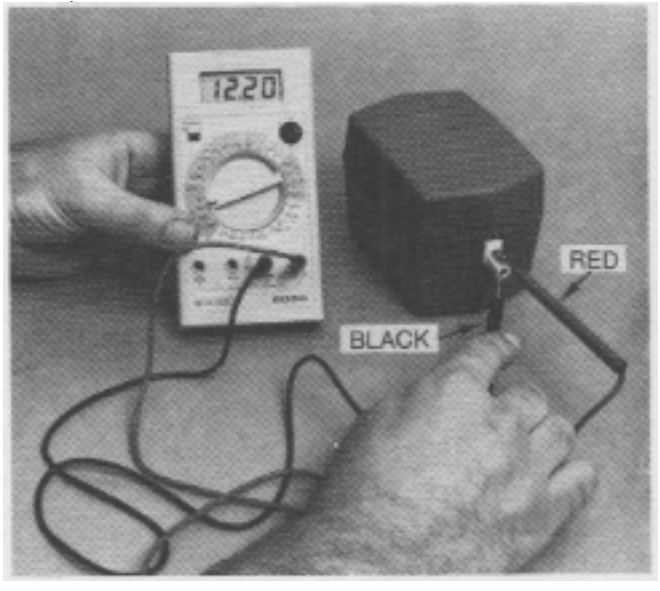
2. The battery does not require charging other than when it will not start the mower.

3. The battery and box assembly may be removed from the mower when it is to be charged.

4. No special storage precautions are necessary.

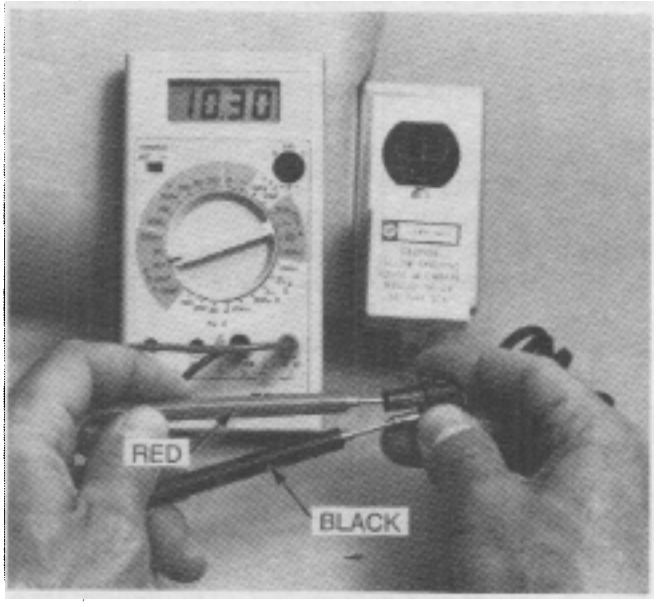
5. It is not necessary to keep the battery on charge when the mower is not in use.

6. After extended periods of storage (over winter months) it may be necessary to charge the battery before electric starts can be accomplished.



12V 100 M.A. (Milliamp) Charger (681369): Testing Procedures

Connect the V.O.M. as shown; be sure the polarity is correct. Plug in the charger to a 120V outlet. The meter reading should be between 8V to 12V DC.



12 Volt Nickel-Cadmium Battery Testing Procedures.

NOTE

Battery has to be out of service and disconnected from the charger for a minimum of 24 hours before testing.

1. Check battery voltage before charging.
2. Charge battery for a minimum of 24 hours.
3. Disconnect charger and let battery set for a minimum of 24 hours.

Battery Voltage must be 12.3 volts or higher after completion of this procedures.

SEALED LEAD ACID (S.L.A.) BATTERY WARRANTY

Open circuit voltage (O.C.V.) of all batteries received on warranty claims will be checked. If they register 11.0 volts or more when received and can be recharged, the warranty claim will be rejected and returned with the battery. If possible, battery should be placed on an electric start mower and checked for cranking ability.

Before returning a battery to the factory with a warranty claim because it "won't hold or take a charge," or "will not crank the engine," please refer to Section 13, pages 16 and 17 of the Lawn-Boy Service Manual for the testing procedures.

Step 1 - Check battery voltage with a volt meter before charging.

Step 2 - If the meter indicates an open circuit voltage (O.C.V.) of 11.0 volts or more, connect it to the Lawn-Boy charger for a period of 24 to 48 hours.

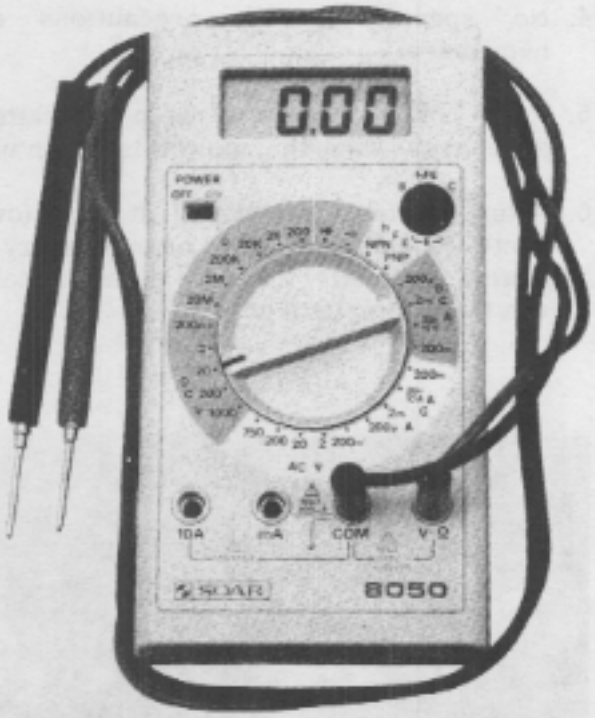
Step 3 - Disconnect charger and let battery set for a minimum of 24 hours.

If battery voltage is 12.3 volts or higher after completion of this procedure, it should be returned to the customer for continued use. If possible, place it on an electric start mower and check for cranking ability.

If possible, the customer's battery charger should be checked. It should produce between 8 and 12 volts on a volt meter.

The Digital Multi Meter illustrated is available from the Lawn-Boy Service Department. It will check AC and DC voltage, AC and DC current, resistance, check diodes, amperes and continuity.

S.L.A. BATTERY



MODEL 8050 SOAR DIGITAL MULTI METER

SEALED LEAD ACID (S.L.A.) BATTERY SERVICING

SEALED LEAD ACID BATTERY PACK

⚠ SAFETY WARNING

DO NOT REMOVE THE SEALED LEAD ACID BATTERIES FROM THE BATTERY PACK. THE BATTERY WILL ARC ACROSS METAL SURFACES CAUSING INJURY OR FIRE. (EXAMPLE: RINGS, WATCHES AND METAL TABLES.)

The S.L.A. battery pack consists of six sealed cells connected together. Each cell contains electrolyte which is an acid solution. They are spill proof.

NOTE:

The S.L.A. battery will have a low charge when shipped from the factory.

NOTE

Before placing the battery in service, it should be charged for a minimum period of 24 hours (Do not exceed 48 hrs.) using the Lawn-Boy 100 M.A. (Milliamp) charger provided. Connect the charger to the battery — then plug charger into 115 volt outlet. Voltage must be 12.3 volts or higher after completion of this procedure.

⚠ SAFETY WARNING

TO PREVENT DAMAGE TO THE BATTERIES, USE ONLY THE LAWN-BOY 100 M.A. (MILLIAMP) TRICKLE CHARGER WHEN CHARGING BATTERY PACK.

IF PROPER CHARGER IS NOT USED, DAMAGE MAY OCCUR TO THE BATTERY OR IT MAY EXPLODE CAUSING INJURY TO YOU OR OTHERS.

SEALED LEAD ACID BATTERY MAINTENANCE

Occasional charging may be required during the mowing season if battery will not start the mower. If battery failure occurs, attach Lawn-Boy trickle charger supplied with mower, and charge for 10-12 hours.

NOTE

NEVER LEAVE THE S.L.A. BATTERY ON CHARGER FOR MORE THAN 48 HOURS AS DAMAGE MAY RESULT.

S.L.A. BATTERY STORAGE

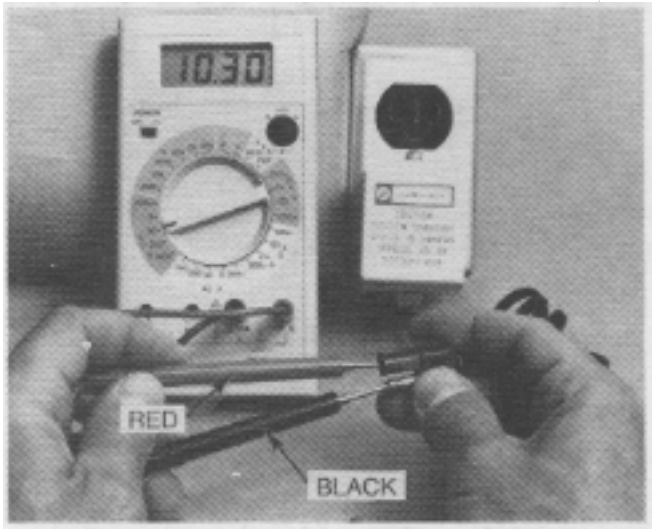
NEVER STORE THE BATTERY IN A "RUN-DOWN" CONDITION. STORE BATTERY FULLY CHARGED (12-14 VOLTS) IN A COOL AREA. CHARGE BATTERY EVERY 1-2 MONTHS FOR A PERIOD OF 10-12 HOURS DURING STORAGE.

NOTE

Never place battery on cement surfaces during storage ie: garage or basement floor. Store battery on a wooden surface.

12V 100 M.A. (milliamp) Charger (681369): Testing Procedures

Connect the V.O.M. (Volt-Ohm-Milliameter) as shown; be sure the polarity is correct. Plug in the charger to a 115V outlet. The meter reading should be between 8V to 12V DC.



12 Volt S.L.A. Battery Testing Procedures

Note: Battery has to be out of service and disconnected from the charger for a minimum of 24 hours before testing.

1. Check battery voltage before charging.
2. Charge battery for a minimum of 24 hours, but not more than 48 hours.
3. Disconnect charger and let battery set for a minimum of 24 hours.

Battery Voltage must be 12.3 volts or higher after completion of this procedure.